

## Description

### LOCKING MEMBER FOR LOCKING A CARD WITH RESPECT TO A SHELF

#### Technical Field

[1] The present invention generally relates to a mobile communication system, and more particularly to a locking member for releasably locking a card with respect to a shelf upon completing a loading process of the card into the shelf.

#### Background Art

[2] Conventionally, a rack used for a mobile communication system performs a communication by using a protocol defined for radio link as well as a control station and a mobile station. As shown in Fig. 1, the rack 10 houses a number of shelves 20 in such a way that the shelves 20 are positioned on numerous stories of the rack 10. The shelf 20 accommodates cards connected to external devices based on a multiplexing scheme.

[3] As shown in Fig. 2, the shelf 20 includes an upper frame 22 having a groove 221 and a lower frame 23 having a groove 231. The shelf 20 also includes a plurality of guiding members 24 separated from one another at a predetermined interval. The guiding member 24 has a guiding rail 241.

[4] Further, the card 30 includes: a printed circuit board 31 adapted to move along the guiding rail 241; a front panel 32 joined to a front end of the printed circuit board 31; and ejectors 40. The ejectors 40 are mounted to an upper portion and a lower portion of the front panel 32 and engaged into the grooves 221, 231 of the upper frame and the lower frame 22, 23.

[5] The ejector 40 includes: a support member 41 fixed to the end of the front panel 32 for preventing movements of the card 30; an engagement member 42 having a protrusion 421 engaged into the groove 221; and an unlocking member 43 rotatably attached to the engagement member 42 for releasing a locked state of the front panel 32.

[6] The prior art process for loading the card 30 by using the ejectors 40 will be described hereunder.

[7] The front panel 32 is first joined to a front end of the printed circuit board 31. Then, the ejectors 40 equipped with the unlocking members 43 are fixed to the front panel 32.

[8] The card 30 equipped with the ejectors 40 in the above manner is inserted into the shelf 20 along the guiding rail 241 of the guiding member 24. Subsequently, a

connector (not shown) of the printed circuit board 31 is connected to a socket of the shelf 20. Next, the protrusions 421 are engaged into the grooves 221, 231 by upward and downward rotations of the engagement members 42. This is so that the card becomes fully loaded in the shelf 20 in order to be accommodated.

[9] Meanwhile, dummy cards 30' are mounted on the guiding members 24 that are not equipped with the card 30 having the printed circuit board 31. Each of the dummy cards 31' includes: a guiding plate 33 that is the same size as the printed circuit board 31; the front panel 32; and the ejectors 40 which are joined to the guiding plate 33.

[10] However, since the ejector which functions to lock the card with the printed circuit board to the shelf has a number of components and a complex manufacturing process, it increases the manufacturing costs while lowering productivity.

[11] Since the dummy cards located in the guiding members that are not loaded with the cards having the printed circuit board also use the ejectors which are expensive for performing the function of the dummy card, the manufacturing costs are further increased.

### **Disclosure of Invention**

### **Technical Problem**

[12] Thus, it is an object of the present invention to provide a card-locking member for locking a card with respect to a shelf by using a resilient force caused by a plate like member upon completing the card loading process into the shelf.

### **Technical Solution**

[13] In order to achieve the above object, the present invention provides a locking member for locking a card with respect to a shelf having an end with a groove upon completing the card loading process into the shelf. The locking member comprises: a connecting section joined to the card; a resilient section extending from the connecting section and having a resilience; and an engagement section formed at an end of the resilient section and having a shape configured to engage into the groove.

### **Brief Description of the Drawings**

[14] Fig. 1 is an exploded perspective view of the prior art communication system.

[15] Fig. 2 is a sectional view showing a state in which a card is locked with respect to a shelf by a prior art locking member.

[16] Fig. 3 is a perspective view of an inventive locking member for locking a card.

[17] Fig. 4 is a sectional view showing a state in which the inventive locking member locks the dummy card with respect to the shelf.

[18] Figs. 5, 6 and 7 illustrate sectional views of the inventive locking member being engaged into the groove of the shelf. Figs. 5 and 7 show the locking member before and after the engagement. Fig. 6 illustrates the locking member abutting an end of an upper frame of the shelf.

### Best Mode for Carrying Out the Invention

[19] One embodiment of the present invention is now described in detail with reference to the accompanying drawings. Corresponding reference numerals are designated for components similar to those shown in the prior art section.

[20] Fig. 3 shows a perspective view of an inventive locking member for locking the dummy card. Fig. 4 is a sectional view showing a state in which the inventive locking member locks the dummy card with respect to the shelf.

[21] The locking member 60 is a fixing or locking member which locks or fixes the card 30 or the dummy card 30' with respect to the shelf 20. The term "dummy card" means a card that is to be mounted on the guiding member 24 on which the card with the printed circuit board 31 is not loaded. In this embodiment, the locking member 60 is applied to the dummy card 30'. However, the inventive locking member 60 can be applied to the card 30 with the printed circuit board 31.

[22] The locking member 60 is first assembled into the dummy card 30' and then the assembly is slid into the shelf 20 for the loading process. Upon completion of the loading process, the locking members 60 are engaged into the grooves 221, 231 of the upper frame and the lower frame 22, 23.

[23] The locking member 60 includes a connecting section 61 to be closely contacted on the front panel 32. This is to allow the locking member to be kept on the dummy card 30'. The locking member 60 also includes: a U-shaped resilient section 62 having resilience and extending from the connecting section 61; an engagement section 63 extending from the resilient section 62; and an extension section 64 extending from the engagement section 63. The engagement section 63 is formed at an end of the resilient section. It has a shape protruding from the resilient section 62 and the extension section 64 and is engagable into the groove 221 or 231. For an unloading process of the dummy card 30' the user can depress the extension section 64. All of the sections 61, 62, 63 and 64 are formed in one piece. The degree of the resilience of the locking member 60 can be adjusted by varying the thickness of the locking member 60.

[24] The locking operation of the dummy card 30' by the inventive locking member 60 as constructed above will be described hereunder.

[25] First, the front panel 32 is assembled with the guiding plate 33 of the dummy card

30'. Next, the locking member 60 is fixed on the front panel 32 by damping the connecting section 61 with the same 32. A through hole 61a of the connecting section 61 and a thread (not shown) can be used for the damping. Then, as shown in Fig. 5, the dummy card 30' equipped with both the front panel 32 and the locking member 60 is slid into the shelf 20. Subsequently, as shown in Fig. 6, when the engagement section 63 abuts an end of the upper frame 22 in the sliding into the shelf 20, the position of the engagement section 63 is lowered due to the shrinkage of the resilient section 62. Thereafter, the engagement section 63 advances into the shelf 20 under a pressing force by the end of the upper frame 22. Next, as shown in Fig. 7, when the engagement section 63 meets the groove 221, the pressing force is removed, while the engagement section 63 is engaged into the groove 221.

[26] Meanwhile, in order to separate the dummy card 30' from the shelf 20, the user presses the extension section 64. The pressing force lowers the vertical position of the engagement section 63, thereby shrinking the resilient section 62. Then, the engagement section 63 can be disengaged from the groove 221. In this situation, when the user pulls the front panel 32 of the dummy card 30' out of the shelf 20, the dummy card 30' exits from the shelf 20 along the guiding rail 241 of the guiding member 24.

[27] The dummy card 30' is loaded into the shelf 20 through the process as described above. In use, the dummy card 30' can be later replaced with the card 30 having the printed circuit board 31. Of course, the locking member 60 may be applied to the card 30 with the printed circuit board 31.

### Industrial Applicability

[28] The inventive locking member for locking the cards with respect to the shelf by using the resilient force has a simple configuration, thereby yielding a simple manufacturing process. Accordingly, the manufacturing costs are significantly reduced.